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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/625,830	07/22/2003	Glenn Houser	034126-003	8963

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EXAMINER	
ROSENBERGER, RICHARD A	
ART UNIT	**PAPER NUMBER**
2877	

DATE MAILED: 09/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/625,830	HOUSER, GLENN	
	Examiner	Art Unit	
	Richard A. Rosenberger	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *28-58* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *28-58* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 28-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al (US 6,392,756) in view of Edgar et al (US 4,885,709) and Adams (US 4,899,055)).

As in independent claims 28, 37 and 49, the Li et al reference shows a tunable light source (56; col. 8, lns. 42-43). The reference shows a first detector (60) which detects light reflected from (claim 46) or transmitted through (claim 47) the material (figs. 9, 10,12), and a computing device (64) which calculates the thickness of a layer based upon the detected light. Although Li et al applies the apparatus and method of that reference to material thinner than the claimed 1 to 1000 microns, it is known in the art that such a method can be used for materials with a thickness in that range; see Edgar et al, which teaches the general method with multiple wavelengths can be used for materials with a thickness of about 10 microns (the sentence bridging cols, 13 and 14). Edgar et al also teaches that infrared light may be usefully used, such as in the 1-3 micron range (see col. 16, ln. 1-3). Thus the known use of such wavelengths to measure in this known manner the thicknesses of material in the 1 to 1000 micron range would have been obvious because, as shown by Edgar et al, it is known to do so. See also

figures 4 and 5 of Edgar et al, which like Li et al, shows both reflected and transmitted light embodiments (claims 46 and 47).

The Li et al reference teaches the light source can be "a tunable laser or any other suitable light source ...". The instant specification (pg. 6, lns. 19-20) states the light source is "a quasi-monochromatic light source (laser) capable of varying its wavelength"; thus the "tunable laser" of the Li et al reference falls within the meaning of the term "quasi-monochromatic light source" as used in this specification.

The Li et al reference discloses that "typically", or "for example", the measurements are made at "1 nm intervals" (col. 7, ln. 63; col. 9, ln. 39) rather than the "less than 0.1 nm" of claim 31, the "less than 0.5 nm" increments of claims 28, 45, 51, and 54 and the "less than one nanometer" of claims 37, 38 and 49. As set forth in the Li reference, this increment is not critical, and other increments could be chosen in accordance with such criteria as the accuracy and precision desired, with smaller increments providing more data for higher accuracy, precision, and thus reliability of the measurements. Those in the art would thus have found it obvious to use the claimed "less than one nanometer", "less that 0.5 nm" increments, or the "less than 0.1 nm" increments in order to achieve the higher precision, accuracy and reliability that the increased data would provide.

As for claims 29, 30, 42, 43, and 44, the Li et al reference does not teach the claimed splitter and second detector forming a reference path to "calibrate the light source". The Adams reference shows, in a film thickness measuring system, a beam splitter (20), a filter (34), and a detector (32), and teaches that this arrangement can be

"used to provide wavelength calibration" (col. 5, lns. 21-22). It would have been obvious to include such a known wavelength calibration in the system such as shown by the Li et al reference because the accuracy of the measurements in a system such as shown by the Li et al reference depends at least in part on the accuracy of the knowledge of what the wavelengths being used actually are.

The Li et al reference teaches that the light detector can by any "suitable light detector" (col. 8, ln. 56). Photodiodes as light detectors are so well known that official notice is sufficient. As in claims 44, and 50, it would have been obvious to choose a known photodiode detector as the "suitable light detector" taught by the Li et al reference.

As in claims 32, 48, the Li et al reference teaches that the light is "at a near-normal incidence" (col. 8, ln. 47), which at least clearly suggests the claimed "less than $\pm 5^{o}$".

As for claims 33, 34, 35, 39, 40, 41, and 52, it would have been obvious to use the technique of the reference to measure other thin film thicknesses that the particular thicknesses discussed in the reference and on substrates such as semiconductor wafers; the technique is, and would have been recognized as, a more general technique applicable to other thicknesses and as not being limited to the material of the substrate.

As in claim 36, for the method of the references to work, the wavelength must be chosen to be partially transparent to the wavelengths of light used.

As for claim 53, it would have been obvious to make the thickness measurement as accurate and reliable as needed or desired for the application at hand. The reference teaches the film thickness can be measured "to within an accuracy of 3 Angstroms or less", if the film being measured has a thickness of more than 300 Angstroms (30 nm, 0.03 μm), then this accuracy would be the claimed less than 1%.

3. Claims 55-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al (US 6,392,756), Edgar et al (US 4,85,709) and Adams (US 4,899,055), as applied to claim 49 above, and further in view of Ruhl, Jr., et al (US 5,357,336).

As discussed above with reference to the Adams reference, in order for the technique of Li et la to be highly accurate, it is necessary to know with precision the wavelengths of the light at the various measuring points. It is known in the art, as shown by Ruhl et al, to use an etalon to calibrate the wavelength of a light source; it would have been obvious to include a known wavelength calibration systems, such as an etalon-based system such as shown by Ruhl et al for the wavelength calibration system of Adams because this use of an etalon calibration system is a known, and known to be accurate, wavelength calibration system.

As in claim 57, the Li et al reference mentions the use of theoretical models in the calculation of the thickness (col. 11, lns. 32-43) and teaches using fitting techniques (col 11, lns. 48-55) as in claim 58.

4. The remarks filed 23 June 2006 argue that Li et la does not measure within the claimed thickness range or use the claimed wavelengths of light. See the newly cited reference to Edgar et al (US 4,885,709). It is noted that Li et al does teach using light with a wavelength of 900 nm (col.9, lns. 37-38) with no indication of any criticality, which suggest the use of light within the range of "greater than 1000 nm" as claimed herein.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A Rosenberger whose telephone number is (571) 272-2428. The examiner can normally be reached on Monday through Friday during the hours of 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on (571) 272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

R. A. Rosenberger
1 September 2006

Richard A. Rosenberger
Primary Examiner